Baghouse Filtration Products

The U.S. EPA Environmental Technology Verification (ETV) Program's Air Pollution Control Technology (APCT) Center, operated by RTI International under a cooperative agreement with EPA has verified the performance of 16 technologies (**Table 1**) for reducing emissions of fine particulate matter ($PM_{2.5}$), and has additional verifications in progress.[1] These technologies use fabric filters to remove particulate matter (PM) from stationary emission sources.

Test Description and Results

During verification testing, each product underwent the following:

- A conditioning period of 10,000 rapid pulse cleaning cycles
- A recovery period of 30 normal filtration cycles
- A six-hour performance test period

During all three periods, the products were subjected to a continuous and constant dust loading. **Table 2** summarizes some of the performance data for the individual baghouse filtration products. Readers may view the full verification reports at **http://www.epa.gov/etv/verifications/vcenter5-2.html** for the complete description of the tests and results.

Baghouses and $PM_{2.5}$ at a Glance

Fabric filters, or baghouses, are widely used for controlling PM from a variety of industrial sources, including utility, industrial, and commercial/institutional coal and wood boilers, metals and mineral processing facilities, and grain milling. Primary particulate emissions from these industry categories accounted for 13% of the national $PM_{2.5}$ emissions in 2001. $PM_{2.5}$ contributes to serious environmental and public health problems, including premature mortality.

To help address the public health effects of $PM_{2.5}$, EPA has established a National Ambient Air Quality Standard (NAAQS) for $PM_{2.5}$. In April 2005, EPA identified 39 areas of the country that exceed the current NAAQS for $PM_{2.5}$. These areas are required to meet the NAAQS for $PM_{2.5}$ by no later than April 2010. States are required to prepare State Implementation Plans (SIPs) by April 2008 to describe how these areas will meet the standards.

Table 1. Verified Baghouse Filtration Products

Technology Name	Description
Air Purator Corporation, Huyglas® 1405M[A]	An expanded polytetrafluoroethylene film applied to a glass felt for use in hot-gas filtration
Albany International Corporation, Primatex™ Plus I[A]	A polyethylene terephthalate filtration fabric with a fine fibrous surface layer
BASF Corporation, AX/BA-14/9-SAXP® 1405M[A]	A Basofil® filter media
BHA Group, Inc. QG061®[A]	A woven-glass-base fabric with an expanded, microporous polytetrafluoroethylene membrane, thermally laminated to the filtration/dust cake surface
BHA Group, Inc. QP131®[A]	A polyester needle felt substrate with an expanded, microporous polytetrafluoroethylene membrane, thermally laminated to the filtration/dust-cake surface
BWF America, Inc. Grade 700 MPS Polyester®[A]	A micropore size, high-efficiency, scrim-supported felt fabric
BWF America, Inc. Grade 700 MPS Polyester® Felt	A micropore size, high-efficiency, scrim-supported felt fabric
Inspec Fibres 5512BRF®[A]	A scrim-supported needle felt
Menardi-Criswell 50-504®[A]	A singed microdenier polyester felt
Polymer Group, Inc. DURAPEX™ PET[A]	A non-scrim-supported 100% polyester, non-woven fabric
Standard Filter Corporation Capture ® PE16ZU®[A]	A stratified microdenier polyester non-woven product
Tetratec PTFE Technologies Tetratex® 8005[A]	A polyester scrim-supported needle felt with an expanded polytetrafluoroethylene membrane
Tetratec PTFE Technologies Tetratex® 6212[A]	A polyester needle felt with an expanded polytetrafluoroethylene membrane
W.L. Gore & Associates, Inc. L4347®[A]	An expanded polytetrafluoroethylene membrane/polyester felt laminate
W.L. Gore & Associates, Inc. L4427®[A]	A membrane/polyester felt laminate
W.L. Gore & Associates, Inc. L3650®	A membrane/fiberglass fabric laminate

[A] Verifications for baghouse filtration products are valid up to three years from verification date. As such these verifications have expired.

[1] The ETV Program operates largely as a public-private partnership through competitive cooperative agreements with non-profit research institutes. The program provides objective quality-assured data on the performance of commercial-ready technologies. ETV does not endorse the purchase or sale of any products and services mentioned in this document.

Selected Outcomes of Verified Baghouse Filtration Products

Verification has increased awareness of baghouse filtration products that could be used to reduce $PM_{2.5}$ at the state, local, and user level, with the following benefits.

- California has adopted a rule (Rule 1156) that reduces the frequency of required compliance testing from annually to every five years for cement manufacturing facilities that use the ETV-verified baghouse fabrics. EPA's Office of Air Quality Planning and Standards is preparing a memorandum to encourage EPA regional offices and other agencies to use the ETV protocol and to consider adopting similar regulations.
- The ETV baghouse filtration protocol has been adopted by ASTM and proposed for adoption by ISO, a worldwide voluntary standards organization.

ETV also estimates that the ETV-verified baghouse filtration products would reduce $PM_{2.5}$ emissions by 7,600 tons per year, assuming 25% market penetration (large facilities only) is achieved in the 39 areas of the country that exceed the NAAQS for $PM_{2.5}$. These $PM_{2.5}$ reductions would result in up to 68 avoided cases of premature mortality per year, with an economic value of up to $450 million per year.

References

U.S. EPA, 2006. **ETV Case Studies: Demonstrating Program Outcomes, Volume II.** EPA/600/R-06/082. September. (primary source)

U.S. EPA ETV, **http://www.epa.gov/etv**.

Table 2. Performance of Verified Baghouse Filtration Products

Technology[A]	Outlet Particle Concentration[B] (g/dscm x 10^{-6})		Residual Pressure Drop (cm w.g.)	Residual Pressure Drop Increase (cm w.g.)
	$PM_{2.5}$	Total Mass		
Membrane Fabrics				
A	50	120	8.5	1.2
B	5.1	23	7.4	0.79
C	13	22	4.9	0.42
D	4.7	11	5.8	0.41
E	15	23	9.4	1.2
F	2.0	2.0	6.2	0.56
G	6.8	38	6.2	0.44
H	<2	<2	2.4	0.18
Non-membrane Fabrics				
I	32	68	7.0	1.7
J	19	70	15	7.8
K	42	68	13	5.3
L	9.4	19	15	6.0
M	270	270	11	4.3
N	10.4	16	6.8	1.1
O	380	420	12	5.1
P	20	20	4.1	0.34

[A] Because the ETV Program does not compare technologies, the performance results shown in this table do not identify the vendor associated with each result and are not in the same order as the list of technologies in Table 1.
[B] The Inlet Particle Concentration is 18.4 ± 3.6 g/dscm (grams per dry standard cubic meter) for this test.
cm w.g. = cm (water gauge)

Installing a fabric swatch in the test apparatus at ETS Incorporated

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